REMARKS

This is a full and timely response to the Office Action mailed May 9, 2005.

By this Amendment, claims 1, 3, 4 and 6 has been amended to more particularly define the present invention. Further, new claim 7 has been added to further protect specific embodiments of the present invention. Lastly, claim 2 has been canceled without prejudice or disclaimer to its underlying subject matter. Support for the claim amendments and new claim can be readily found variously throughout the specification and the original claims, see, for example, original claims 1 (i.e., *the reaction is carried out after or while the carbon radical(s) is generated in the polymer to be modified*), and claims 2-4, Examples 1-6 where OH-TEMPO is used, page 2, lines 6-16, page 3, line 14 to page 5, line 9, and page 8, line 15 to page 13, line 33 of the specification. Applicant note that the structure of "OH-TEMPO" is shown on page 8, line 15 of the specification. Thus, claims 1 and 3-7 are currently pending in this application.

Applicant also notes that the chemical formula on page 9, lines 20-25, of the specification has been amended to correct a minor typographical error.

Applicant believes that all pending claims are in condition for allowance. Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

Objection to the Claims

Claim 1 is objected to for the informalities set forth in item 2 of the Office Action. Applicant respectfully traverses this objection. However, in the interest of expediting the prosecution of the present application, Applicant has inserted a comma (",") after the term "*radical(s)*" and added the phrase "*said process*" before "*comprising*", in view of the Examiner's objection.

Rejections under 35 U.S.C. §102

Claims 1-6 are rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Ashiura et al. (U.S. Patent 6,653,409 B2). Applicant respectfully traverses this rejection.

To constitute anticipation of the claimed invention under U.S. practice, the prior art reference must literally or inherently teach each and every limitation of the claims. Here, in this case, Ashiura et al. fails to teach the limitations "*generating a carbon radical(s) in the*

molecule of a polymer to be modified by at least one means for generating a carbon radical selected from the group consisting of a radical initiator, electron beam, light and radiation; and reacting the polymer having the carbon radical(s) generated above with a compound(s) having the mono-nitroxide free radical stable at an ordinary temperature in the presence of oxygen".

As defined by the above amended claims 1-7 and in particular, amended claim 1, the essence of the present invention resides in the production of the modified polymer by (1) positively or forcibly generating a carbon radical in the polymer molecule by means of the specified carbon radical generating means (i.e., a radical initiator, electron beam, light and/or radiation) (see page 12, line 35 to page 13, line 33 of the specification), and then (2) reacting the generated carbon radical in the polymer molecule with the compound having a mono-nitroxide radical stably present even in the presence of oxygen at an ordinary temperature. By employing such a process, the bondability and processability of the modified polymer are remarkably improved. Such a process and result is not disclosed or suggested in Ashiura et al.

Although Ashiura et al. discloses the radical-modified polymer having a free radical compound stable in the presence of oxygen at an ordinary temperature, the use of the specified carbon radical generating means for positively or forcibly generating the carbon radical in the molecule of the polymer is neither disclosed nor taught in Ashiura et al. According to the Examples of Ashiura et al., the modification is made by reacting the stable free radical (i.e., 4-TEMPO-glycidyl ether) usually at the living terminal derived from n-BuLi, whereby the terminal of the polymer is modified with 4-TEMPO-glycidyl ether. Also, according to the description of Ashiura et al. (see column 2, lines 34-47), the modified polymer is believed to trap the carbon radicals formed due to, for example, the shearing during the processing of rubber, whereby the unpreferable decrease in the molecule can be suppressed. However, as disclosed in the present specification (see, for example, page 2, lines 6-16), this is not sufficient to positively improve the intended properties of the modified polymer, as in the present invention. Hence, it is clear that the use of the forcible carbon radical generating means is completely absent in Ashiura et al.

Thus, for these reasons, withdrawal of the present rejection is respectfully requested.

Claims 1-2 and 4-6 are rejected under 35 U.S.C. §102(e) or §102(b) as allegedly being anticipated by Bertin et al. (U.S. Patent Publication 2003/0139536 A1) or Masayoshi et al. (JP 10182881 A). Applicant respectfully traverses these rejections.

Like Ashiura et al., both Bertin et al. and Masayoshi et al. fails to teach the limitations "*generating a carbon radical(s) in the molecule of a polymer to be modified by at least one means for generating a carbon radical selected from the group consisting of a radical initiator, electron beam, light and radiation; and reacting the polymer having the carbon radical(s) generated above with a compound(s) having the mono-nitroxide free radical stable at an ordinary temperature in the presence of oxygen*".

Bertin et al. discloses the preparation of thermoreversible branched or crosslinked resin (see Abstract, claim 1, paragraph [0001] of Bertin et al.) by heat treatment of a polymer in the presence of a multifunctional nitroxide, optionally a free radical initiator. However, in the present invention, the stable free radical is restricted to --*mono-nitroxide*--, based upon, for example, Examples 1-4 of the present application. Hence, the present invention is clearly different from Bertin et al. based on the different types of the stable free radical.

When a compound having a multifunctional nitroxide radicals (i.e., a compound having two or more nitroxide free radicals) is used, there is a possibility that the compound having two or more nitroxide radicals will react with two or more different polymers having the generated carbon radicals through the nitroxide radicals, whereby the two or more polymers are crosslinked. The formation of the crosslinked polymer adversely affects the processability of the resultant polymer. This, in turn, clearly indicates that the polymer of Bertin et al. does not possess the improved bondability and processability characteristics of the presently claimed polymer.

In Masayoshi et al., a rubber composition containing a diene rubber, a reinforcing agent and a compound having, in the molecule thereof, a radical stable even in the presence of oxygen at an ordinary temperature, is disclosed. However, like Ashiura et al., the generation of the carbon radical in the polymer by the use of the specified carbon radical generating means is completely absent in Masayoshi et al.

Thus, for these reasons, withdrawal of the present rejections is respectfully requested.

Claim 6 is rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Veregin et al. (U.S. Patent 5,610,250) or Onoi et al. (JP 2000-212329 A). Applicant respectfully traverses these rejections.

Claim 6 is directed a modified polymer obtained directly by a process according to claim 1. In contrast, Veregin et al. discloses a polymerization process for producing the polymer comprised of a covalently bound free radical initiator fragment at one end and a covalently bound stable free radical compound at the other end of the polymer. This modified polymer is completely different from the present modified polymer. As mentioned above, according to the present invention, the polymer is first attached by the specified carbon radical generating means, followed by reacting the generated carbon radical in the polymer with the mono-nitroxide stable free radical compound.

Onoi et al. discloses a rubber composition containing therein the compound having the free radical stable at an ordinary temperature in the presence of oxygen so as to suppress the increase in the viscosity during storage. Again, like Veregin et al., the positive or forcible generation of the carbon radical in the polymer, followed by reacting the mono-nitroxide stable free radical thereto is completely absent in Onoi et al.

Thus, for these reasons, withdrawal of the present rejections is respectfully requested.

CONCLUSION

For the foregoing reasons, all the claims now pending in the present application are believed to be clearly patentable over the outstanding rejections. Accordingly, favorable reconsideration of the claims in light of the above remarks is courteously solicited. If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

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Respectfully submitted,

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